

CLAIMS

THE FOLLOWING IS CLAIMED:

1 1. A process for low-damage anisotropic dry etching of a substrate, comprising the
2 steps of:

3 placing a substrate on a mechanical support within a plasma reactor, said
4 mechanical support isolated from the creation of the plasma; and

5 subjecting the substrate to a plasma including low energy electrons having a
6 kinetic energy less than about 100 eV and at least one species reactive with the substrate.

1 2. The process of Claim 1, further comprising the step of selecting said substrate
2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-
3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating
4 substrates.

1 3. The process of Claim 1, wherein said plasma reactor generates a dc plasma.

1 4. The process of Claim 1, wherein said plasma reactor generates an ac plasma.

1 5. The process of Claim 1, wherein said mechanical support is electrically biased,
2 said mechanical support imparting said electrical bias upon the substrate.

1 6. The process of Claim 5, wherein said mechanical support imparts a dc electrical
2 bias upon the substrate .

1 7. The process of Claim 5, wherein said mechanical support imparts an ac bias upon
2 the substrate.

1 8. The process of Claim 5, wherein said mechanical support imparts both a dc and an
2 ac bias upon the substrate.

1 9. The process of Claim 5, further comprising the step of periodically modulating
2 said electrical bias of said mechanical support to a value below that of a value of the plasma.

1 10. The process of Claim 1, further comprising the step of including an additional
2 structure within said plasma, said additional structure capable of being electrically biased.

1 11. The process of Claim 10, wherein said additional structure is dc electrically
2 biased.

1 12. The process of Claim 10, wherein said additional structure is ac electrically
2 biased.

1 13. The process of Claim 10, wherein said additional structure is both ac and dc
2 electrically biased.

1 14. A process for low-damage anisotropic dry etching of a substrate, comprising the
2 steps of:

3 providing a direct current plasma reactor including a cathode and an anode;
4 placing a semiconductor on the anode of the direct current plasma reactor;
5 generating low energy electrons with a cold cathode;
6 subjecting the semiconductor to a plasma including low energy electrons and a
7 species reactive with the semiconductor; and

8 placing an additional structure within said plasma, said additional structure
9 capable of being electrically biased.

1 15. The process of Claim 14, further comprising the step of selecting said substrate
2 from the group consisting of Group III-V semiconductors, Group IV semiconductors, Group II-
3 VI semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating
4 substrates.

1 16. The process of Claim 14, wherein said additional structure is dc electrically
2 biased.

1 17. The process of Claim 14, wherein said additional structure is ac electrically
2 biased.

1 18. The process of Claim 14, wherein said additional structure is both ac and dc
2 electrically biased.

1 19. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:
2 a plasma reactor; and
3 a mechanical support within said plasma reactor, said mechanical support isolated
4 from the creation of the plasma.

1 20. The apparatus of Claim 19, wherein said substrate is selected from the group
2 consisting of Group III-V semiconductors, Group IV semiconductors, Group II-VI
3 semiconductors, metals, alloys of the foregoing, superconductors, polymers, and insulating
4 substrates.

1 21. The apparatus of Claim 19, wherein said plasma reactor generates a dc plasma.

1 22. The apparatus of Claim 19, wherein said plasma reactor generates an ac plasma.

1 23. The apparatus of Claim 19, wherein said mechanical support is electrically biased,
2 said mechanical support imparting said electrical bias upon the substrate.

1 24. The apparatus of Claim 23, wherein said mechanical support imparts a dc
2 electrical bias upon the substrate .

1 25. The apparatus of Claim 23, wherein said mechanical support imparts an ac bias
2 upon the substrate.

1 26. The apparatus of Claim 23, wherein said mechanical support imparts both a dc
2 and an ac bias upon the substrate.

1 27. The apparatus of Claim 19, further comprising an additional structure within said
2 plasma, said additional structure capable of being electrically biased.

1 28. The apparatus of Claim 27, wherein said additional structure is dc electrically
2 biased.

1 29. The apparatus of Claim 27 , wherein said additional structure is ac electrically
2 biased.

1 30. The apparatus of Claim 27, wherein said additional structure is both ac and dc
2 electrically biased.

1 31. An apparatus for low-damage anisotropic dry etching of a substrate, comprising:
2 a direct current plasma reactor including a cathode and an anode;
3 a semiconductor placed on the anode of the direct current plasma reactor;
4 means for generating low energy electrons with a cold cathode;

5 means for subjecting the semiconductor to a plasma including low energy
6 electrons and a species reactive with the semiconductor; and
7 an additional structure within said plasma, said additional structure capable of
8 being electrically biased.

1 32. The apparatus of Claim 31, wherein said substrate from the group consisting of
2 Group III-V semiconductors, Group IV semiconductors, Group II-VI semiconductors, metals,
3 alloys of the foregoing, superconductors, polymers, and insulating substrates.

1 33. The apparatus of Claim 32, wherein said additional structure is dc electrically
2 biased.

1 34. The apparatus of Claim 32, wherein said additional structure is ac electrically
2 biased.

1 35. The apparatus of Claim 32, wherein said additional structure is both ac and dc
2 electrically biased.